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THE ROCKEFELLER FOUNDATION

INTERNATIONAL
HEALTH COMMISSION

FIRST ANNUAL REPORT
June 15, 1914 to December 31, 1914

Printed by the
Rockefeller Foundation
at New York, New York, N. Y., U. S. A.
January, 1915

(Publication No. 2)

THE ROCKEFELLER FOUNDATION

INTERNATIONAL HEALTH
COMMISSION

FIRST ANNUAL REPORT
June 27, 1913—December 31, 1914

Offices of the Commission
61 Broadway, New York, N. Y., U. S. A.
January, 1915

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Rockefeller Foundation
4.24.20

INTERNATIONAL HEALTH COMMISSION

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JOHN D. ROCKEFELLER, JR.*
Chairman

WICKLIFFE ROSE
Director-General

JEROME D. GREENE*
Recording Secretary

Charles W. Eliot	Charles O. Heydt*
Simon Flexner*	David F. Houston
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William C. Gorgas	Walter H. Page
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John A. Ferrell, M. D.
Assistant Director-General

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Director of Surveys and Exhibits

J. H. White, M. D.
Director for Latin America

H. H. Howard, M. D.
Director for the West Indies

Victor G. Heiser, M. D.
Director for the East

* Members of the Executive Committee.

To the President of the Rockefeller Foundation:

Sir:—

I have the honor to submit herewith my report as
Director-General of the International Health Commission
for the period June 27, 1913, to December 31, 1914.

Respectfully submitted,

WICKLIFFE ROSE,
Director-General.

CHAPTER I

GENERAL SUMMARY

The International Health Commission was created June 27, 1913, by the Rockefeller Foundation. Its object is the "promotion of public sanitation and the spread of the knowledge of scientific medicine," with the world as its field. Funds for its maintenance are provided by the Rockefeller Foundation, a permanent institution, endowed by Mr. John D. Rockefeller with one hundred million dollars, and chartered by the State of New York, U. S. A. The Executive Committee of the Foundation, composed of five men, residents of New York City, are members of the Commission *ex officio*. The Foundation, in creating the Commission, adopted the following resolution:

WHEREAS, the Rockefeller Sanitary Commission, organized in 1909 for the eradication of hook-worm disease in the United States, has found more than two million people in the Southern States to be infected with the disease, involving vast suffering, partial arrest of physical, mental and moral growth, great loss of life, and noticeable decrease in economic efficiency over vast regions; and

WHEREAS, the Commission has treated or caused to be treated more than five hundred thousand persons; has ascertained that the diagnosis of the disease can be made with ease and certainty and that it can be readily cured and easily pre-

vented; has found that the people, physicians, state boards of health, county and municipal officers are eager to coöperate in all helpful ways, and that, following the treatment and cure of this disease, an intelligent public interest is awakened in hygiene and in modern scientific medicine and in practical measures for permanent public sanitation; and

WHEREAS, the Commission has ascertained by diligent and extensive inquiry that hookworm disease prevails in a belt of territory encircling the earth for thirty degrees on each side of the equator, inhabited, according to current estimates, by more than a thousand million people; that the infection in some nations rises to nearly ninety per cent of the entire population; that this disease has probably been an important factor in retarding the economic, social, intellectual and moral progress of mankind; that the infection is being spread by emigration; and that where it is most severe little or nothing is being done toward its arrest or prevention; therefore be it

RESOLVED, that this Foundation is prepared to extend to other countries and peoples the work of eradicating hookworm disease as opportunity offers, and so far as practicable to follow up the treatment and cure of this disease with the establishment of agencies for the promotion of public sanitation and the spread of the knowledge of scientific medicine; and to this end be it

RESOLVED, that this work be entrusted to a special committee to be called the International Health Commission, consisting of the members for the time being of the Executive Committee of this Foundation and such other persons, members of the Foundation or otherwise, as they may associate with themselves, and be it further

RESOLVED, that the International Health Commission be authorized to adopt such policies and to employ such agencies as it may deem best adapted for the conduct of the work, and also to adopt rules and regulations for its own government and for the expenditure of such funds as shall be placed at its disposal; and

RESOLVED, that at each annual meeting of the Foundation, the International Health Commission shall report to the Foundation in detail its operations and expenditures, and shall present for approval its budget for the following year.

Pursuant to this resolution, the following persons were made members of the International Health Commission: John D. Rockefeller, Jr., Jerome D. Greene, Wickliffe Rose, Charles W. Eliot, Simon Flexner, Frederick T. Gates, William C. Gorgas, Charles O. Heydt, David F. Houston, Starr J. Murphy, Walter H. Page, and William H. Welch. Officers of the Commission were elected as follows: John D. Rockefeller, Jr., Chairman; Jerome D. Greene, Recording Secretary; Wickliffe Rose, Director-General. John A. Ferrell, M. D., was appointed Assistant Director-General, his term of service to begin July 1, 1913. The Commission opened offices in Washington, D. C., in connection with the offices of the Rockefeller Sanitary Commission, and the work of preliminary organization began.

I

WHAT THE COMMISSION HAS UNDERTAKEN
TO DO

The resolution creating the Commission assigned to it two tasks: (1) "to extend to other countries the work of eradicating hookworm disease as opportunity should offer"; and (2) "so far as practicable to follow up the treatment and cure of this disease with the establishment of agencies for the promotion of public sanitation and the spread of the knowledge of scientific medicine." In keeping with this definition of purpose the Commission has directed its initial efforts to the first and more immediate task of extending to foreign countries work for the relief and control of uncinariasis or hookworm disease.

The relief and control of this one disease is an undertaking of enormous magnitude. The infection belts the globe in a zone about 66° wide, extending roughly from parallel 36° north to parallel 30° south. Practically all countries within this zone are infected. Of the 1,600,000,000 people inhabiting the globe, about 900,000,000 live in countries where the infection is prevalent.*

In many countries infection is extremely prevalent. Of 548,992 rural children microscopically examined in the Southern states, 39 per cent were found to be infected. Reports received by the Rockefeller Sanitary Commission

*See *Publication No. 6*, of the Rockefeller Sanitary Commission, "Hookworm Infection in Foreign Countries," pages 3 and following.

in 1911, and summarized in its *Publication No. 6*, estimate: that of the population of Colombia living between sea level and 3,000 feet above, 90 per cent are infected; that of the population of British Guiana, 50 per cent are infected, the infection among the coolies on sugar estates being even greater; that in Dutch Guiana the infection on many plantations runs as high as 90 per cent; that in Egypt the infection of the laboring population is approximately 50 per cent; that 50 per cent of the Indian coolies on sugar and tea estates in Natal are infected; that on many plantations in Ceylon the infection runs as high as 90 per cent; that there is an extremely heavy infection in some parts of India and among the coolies on many estates in Malaya and Fiji which import their labor from India; that the southern two-thirds of the Chinese Empire is involved, the infection in many parts of the Yangtse Valley running as high as 70 to 76 per cent among the farming population.

The relief and control of the disease in a given country involves: (1) making a survey to determine the geographic distribution and the approximate degree of infection; (2) microscopically examining the people and curing those who are found infected; and (3) setting in operation and making effective such sanitary measures as will

put a stop to soil-pollution. Dr. Howard's report of the work being done in British Guiana* gives a definite conception of what is required for the relief and control of the disease in a small area. With this in mind one may get some comprehension of what is involved in an effort to extend this work to the whole infected zone, with its 900,000,000 people.

The International Health Commission has not undertaken to eradicate uncinariasis in any country. The accomplishment of this result will require the operation of permanent agencies working over long periods of time. The attitude assumed by the International Health Commission toward this work is that assumed by the Rockefeller Sanitary Commission in its coöperation with the Southern States, namely: that the bringing of this disease under control in any country is a work which no outside agency working independently could do if it would, and one which no outside agency should do if it could; that if the infection is to be stamped out in any area the country in which it exists must assume the responsibility; and that the Commission may be of service in so far as it may coöperate with the Governments of foreign countries in organizing and making effective their own agencies. In this spirit the Commission has accepted the invitation of eleven

*See *Publication No. 1*, "The Eradication of Ankylostomiasis: Methods and Administrative Measures as Illustrated by the Campaign in British Guiana."

foreign countries during the current year to coöperate in the relief and control of this disease. It is prepared to extend this coöperation to other countries as conditions invite.

II

PRELIMINARY INVESTIGATIONS AND CONFERENCES

At the first meeting of the International Health Commission, June 27, 1913, the Director-General was authorized to go in person or to send a representative to British dependencies and to Latin-American countries for the purpose of preliminary investigation and conference. Travel on these missions consumed most of the time of the Director-General during the first twelve months of the Commission's existence. Three such journeys were made: (1) to England; (2) to the British West Indies; and (3) to Egypt and British dependencies in the Far East. Dr. J. H. White, of the United States Public Health Service, represented the Commission on similar journeys to countries in Central America.

1. To England:—The Commission's first step in the direction of coöperation with foreign countries was a visit to England for conference with British medical authorities and the British Government. This visit had been arranged by the American Ambassador in London, Mr. Walter H. Page, himself a member of the Inter-

national Health Commission and keenly interested in what it was proposing to do. The Director-General arrived in London on August 10, 1913. A series of conferences followed, the most important of which was at a dinner given by Mr. Page, on August 13, at the Marlborough Club. Among those present were Lord Crewe, Secretary of State for India; the Right Honorable Lewis Harcourt, Secretary of State for the Colonies; and a group of scientists, physicians, and government officials whose advice and suggestions were of great value.

The Director-General exhibited by means of lantern-slides the work which had been done by the coöperation of the Rockefeller Sanitary Commission with the Southern States for the relief and control of hookworm disease; described in detail the methods by which the results exhibited had been accomplished; and explained that the International Health Commission is prepared to extend the work to other countries where the infection is prevalent and where conditions seem to invite such extension. Dr. Sandwith told of his experience with uncinariasis in Egypt, where more than 50 per cent of the working population of the Delta are infected. Dr. Balfour described conditions as he had seen them in the Soudan; Dr. Godfrey, Surgeon-General of British Guiana, told of the bringing

of a heavy infection to the sugar estates of that country by the importation of coolie laborers from India; Dr. Shipley, Sir Thomas Robinson, Sir Thomas Barlow, and others contributed details bearing on sanitary requirements or picturing conditions in India, Ceylon, the Malay States, Australia, and the Fiji Islands. Finally, Mr. Harcourt, after speaking in most generous terms of the work done in the States, gave the Commission an urgent invitation to visit the Colonies, offering all the facilities of his office, and assuring the Commission of the hearty co-operation of the local governments. Lord Crewe spoke in similar spirit for India.

It remained only to work out details. As a result of a series of conferences held at the Colonial Office it was agreed that there should be an English Advisory Committee, with headquarters at the Colonial Office, in London. The Secretary of State for the Colonies addressed a communication to the British Colonies endorsing the Commission and its work and accrediting its representatives to the Governments of those countries. It was agreed that the Commission's first work in foreign countries should be in the British West Indies. The following consented to serve as members of the English Advisory Committee:

RIGHT HONORABLE VISCOUNT BRYCE, O.M., Chairman.
PROFESSOR J. S. HALDANE, F.R.S.

DR. A. E. SHIPLEY, F.R.S.

DR. A. G. BAGSHAW, Director of the Tropical Diseases
Bureau.

SURGEON-GENERAL SIR R. HAVELOCK CHARLES,
G.C.V.O., Representing the Indian Government.

MAJOR SIR T. B. ROBINSON, K.C.M.G., Agent-General
for Queensland.

SIR H. MCCALLUM, G.C.M.G.

SIR F. M. HODGSON, K.C.M.G.

SIR DAVID SEMPLE, Representing the Egyptian Govern-
ment.

MR. H. J. READ, of the Colonial Office.

MR. G. GRINDLE, of the Colonial Office.

MR. H. R. COWELL, of the Colonial Office, Secretary of
the Committee.

2. To the British West Indies:—During the months of October, November, and December, 1913, the Director-General made a journey to the British West Indies, visiting Barbados, Trinidad, British Guiana, Grenada, St. Vincent, St. Lucia, and Antigua. The purpose of this journey was to make a preliminary investigation of the conditions of infection, to study the local conditions bearing on the problem of relief and control, and to discuss with physicians and government authorities working plans for the extension of the service to the colonies in which the infection was found to be prevalent and in which conditions seemed to favor coöperation for its relief and control. In each of the coun-

tries visited the Commission's representative was received most cordially and was given every facility for carrying out the purpose of his mission. He made extensive journeys over the Islands, visited hospitals, and made clinical examination of the inmates of prisons, poor-houses, and asylums for the insane. He inspected children in the schools, and examined large numbers of coolies on estates. Of the seven colonies visited uncinariasis was found to be prevalent in six, and tentative plans were agreed upon providing for the extension of the service to each of these infected countries.

3. **To the East:**—In March, 1914, the Director-General sailed again for England on his way to the East. After conference with the English Advisory Committee in London, he proceeded to Egypt, Ceylon, and the Federated Malay States, returning to the United States by way of the Philippines and Japan. By invitation of the Commission, Dr. F. M. Sandwith, of the London School of Tropical Medicine, accompanied him on his journey as far as Ceylon.

In Egypt the Commission's representatives were given a most cordial reception. Lord Kitchener, the British High Commissioner, was making public health the chief feature of his administration and was centering attention especially on Egypt's four endemic scourges:—

uncinariasis, bilharziasis, pellagra, and ophthalmia. He expressed himself as eager to have the coöperation of the Commission; and gave assurances that any effective plan for the improvement of health conditions in Egypt would have the active support of the Government. Three weeks of observation in Egyptian hospitals and in the field tended to confirm the estimate that more than half the farming population of the Delta harbor Uncinaria. At the Church Mission hospital, in Cairo, about 600 patients from all parts of Egypt were seen under treatment for uncinariasis at one time (See Fig. 17). Many of these were extremely severe cases. A working plan providing for the coöperation of the Commission and the Government in making a demonstration in one province was formulated and adopted.

In Ceylon the Government, the Department of Health, and the Planters' Association united in extending every facility for the observation of conditions in that Island. The Commission's representatives made journeys afield covering a large portion of the infected area. They visited hospitals, made clinical examination of large numbers of coolies on tea and rubber estates, inspected children in the schools, and conferred with physicians, planters, and estate managers in both the up-country and the low-country

sections of the infected area. Some microscopic examinations were made at the Ratnapura Hospital to check the results of clinical diagnosis.

There can be no mistaking the prevalence and the disabling effects of uncinariasis in Ceylon. On many rubber estates in the low-country districts local physicians have estimated that 90 per cent of the coolies are infected; and this estimate would seem to be not excessive. The laborers on these estates are Tamils brought over from India, and most of them are infected before they reach Ceylon. Conditions on the rubber estates tend to increase the infection. The coolies are massed in lines; the lines are not provided with latrines; the habit of the coolies is to befoul the soil about the lines and on the estates; the climate is warm and moist and the ground is well shaded by the rubber trees; and the coolies of all ages work with bare feet and bare legs in contact with the polluted soil. As a result of these conditions the anæmias on some of the rubber estates visited are as extreme as they were on the coffee estates in Porto Rico when the Porto Rico Anæmia Commission began its work in 1904.

At the request of the Government, the Principal Civil Medical Officer, and the Planters' Association, the Commission's representative submitted a tentative working plan providing

for a demonstration on a small scale to be carried out on a selected group of estates. It was not considered necessary for the Commission to contribute funds toward the maintenance of the work; Ceylon is a highly prosperous country, and had on hand at this time an accumulated surplus medical fund which the Government proposed to use for this purpose. An officer was appointed to have charge of the work, the areas were selected, and microscopists were put under training for the work. On the outbreak of the European war this work was suspended.

In Malaya the Commission's representative was given opportunity to extend his observations from Panang to Singapore. Official records which had been prepared for his coming were placed in his hands; with medical officers he visited Government and estate hospitals, inspected coolie lines, examined clinically about 2,000 coolies on cocoanut and rubber estates, and conferred with physicians, planters, and Government officials in the Straits Settlements and the Federated Malay States.

There is much difference of opinion among the physicians in Malaya as to the importance of uncinariasis as a menace to health and working efficiency in that country. That uncinariasis is prevalent in Malaya there is abundant evidence. Most of the laborers on the large estates

are Tamils brought over from Southern India, and the indications are that a large percentage of these are infected before leaving India. But the clinical examination at Port Swettenham of 796 Tamils just arrived from India would indicate that the medical examination in India of intended immigrants to the Federated Malay States weeds out all the severe cases, so that those reaching the estates in Malaya are, so far as gross clinical symptoms go, physically fit. The indications are that on many of the rubber estates the infection increases and that severe anæmias result. But the disabling disease of first importance on these rubber estates is malaria. The anæmia of uncinariasis is not to be distinguished from the anæmia of malaria. The two diseases are so complicated that it is extremely difficult to determine whether or not uncinariasis on these estates is a sufficient menace to health to justify special effort for its relief and control. In view of this uncertainty, it was agreed in conference at Government House that the first effort should be directed toward ascertaining the facts; and that to this end a scientific commission should be appointed, supplied with necessary funds and equipment, and given the field with a free hand. This proposal has been approved by the Colonial Office and by the International Health

Commission, and the organization of the uncinariasis commission is now under way.

In the Philippines the Commission's representative had opportunity for a brief but rather comprehensive survey of the remarkable work which has been done in these Islands by the Department of Public Health during the brief period of American occupation. As a result of this visit, Dr. Victor G. Heiser, under whose direction this work has been done, has accepted a position with the International Health Commission as Director of its work for the East.

4. To Central America:—On all journeys for preliminary investigation and conference in Central American countries the Commission was represented by Dr. Joseph H. White, of the United States Public Health Service, who on leave of absence accepted a position with the Commission for one year as Director of the Commission's work in Latin-American countries. He visited Panama, Costa Rica, Guatemala, and Nicaragua. In each of these countries he conferred with physicians, planters, and Government officials, and made preliminary investigations similar to those made in the West Indies and in the East. In each of these countries uncinariasis was found to be prevalent.

In some areas in these countries, where there is a heavy infection among the white or the Indian population, the disease is producing severe anæmias, reminding one of its effects on the white people in the Southern States or on the jibaros in Porto Rico. In each of these four countries the Government has invited the Commission to coöperate in the work of relief and control. These invitations have been accepted and funds for starting work on a small scale have been appropriated. Work is well under way in Panama and Costa Rica, and preliminary arrangements have been made for its opening in the other two countries.

III

ORGANIZATION OF WORK AND WORKING AGENCIES

Following these journeys for preliminary investigation of local conditions and for conference with local authorities, definite steps were taken to organize work and working agencies for the relief and control of uncinariasis in British Guiana, Trinidad, Grenada, St. Vincent, St. Lucia, Antigua, Panama, Costa Rica, Guatemala, Nicaragua, and Egypt; and to create a scientific commission to study the relative importance of uncinariasis as a disabling disease in Malaya and other countries in the East.

1. **Work under authority and direction of Government:**—In each country where this work is in progress it is being done under the authority and direction of Government. This is regarded as fundamental. The International Health Commission does not undertake to eradicate *uncinariasis* in any country; the infection can be brought under final control only by means of permanent agencies working over long periods of time. The Commission, therefore, while coöperating with Governments in the work of immediate relief, seeks to do this in such a way as to aid in building up permanent public health agencies for the control of this disease and all other diseases.

2. **Work begins on small scale:**—The plan of work adopted for each country makes provision for beginning operations on a small scale. This has distinct advantages. The opening of work in each new country must be in the nature of an experiment. By beginning operations on a small scale opportunity is given, without waste of funds, to try out agencies and methods until they have become adjusted to local conditions. When the effective working unit for these conditions has been ascertained this unit can be multiplied at will. On opening work in a new country it becomes necessary also to train a local staff of microscopists, nurses, and caretakers for

the service. When it has become standardized, the service itself is the best training-school for its own employes; and the training of employes goes hand in hand with the enlargement of the work.

3. Three prevailing types of working organizations:—Effort to adjust the work in each country to local conditions has given rise to a certain degree of diversity in agencies employed and in methods of work pursued. There are three prevailing types: one in Egypt, one in Central America, and one in the West Indies. The general principles of administration and the main lines of work undertaken are common to all.

In Egypt conditions seem to make it necessary to administer treatment to all of the patients under hospital conditions. This was the determining factor in the organization of the work. Sharqia Province, with a population of about 879,646, was selected as the territorial unit of operations for the first demonstration; it is proposed in due course to cover the whole of this territory. The single working unit is the traveling hospital camp under tents, in which provision is made for its own staff, and for 100 in-patients. A laboratory is provided for the microscopic examination of fæces, urine, and blood; and a small separate enclosure or harem is reserved for women patients. The staff

required to operate this unit consists of two doctors, a clerk, two male and one female attendants, a cook, a gate-keeper, a water-carrier, a watchman, and a messenger-boy.

The plan of work designed to cover the whole province provides for one large traveling hospital; four small traveling hospitals, each capable of dealing with a hundred patients at a time; and in the capital town of the Province a group of house hospitals, each capable of accommodating 30 in-patients. In addition to this hospital accommodation for the treatment of patients, the scheme provides for making a survey of the Province to determine the degree of infection, and for making a sanitary survey to locate the danger-points about the villages from which the infection is spread. The whole of this working organization is under the direct supervision of Dr. A. MacCallan, of the Government Department of Public Health.

In Central America the determining factor in the organization of the work has been the dispensary method of treatment, as carried out in the Southern States by the Rockefeller Sanitary Commission. The organization and the equipment are relatively simple. The *personnel* consists of: (1) a State Director; (2) under him a staff of Field Directors; and (3) with each Field Director one or more microscopists.

The State Director is a Government official, an officer of the Government department of health, and is clothed with the powers and responsibilities belonging to such position. He is, under the department of health, the organizing and directing head of the work for the relief and control of uncinariasis in his country, and is responsible for the efficiency of the service. He reports quarterly to the Government department of health, and through this department to the International Health Commission.

Under the direct supervision of the State Director is a staff of Field Directors, who have immediate charge of the work in the field. They constitute an ambulant service, each in charge of a circuit of dispensaries. To each Field Director is assigned a district. In this district he locates a convenient number of dispensary points, and visits each of these dispensaries at stated times. To these dispensaries the people come for free examination and treatment. Diagnosis is by microscopic examination of the fæces, the presence of infection being determined by finding eggs of the parasite in the patient's stool. The field director is given as many microscopists as are needed to do the work.

This working organization operates the dispensaries, makes the infection survey and the sanitary survey, and conducts a continuous campaign of education.

In the West Indies the determining factor in the organization has been the purpose to approximate, as nearly as practicable, complete relief and control of uncinariasis within a given area. This was first tried out in British Guiana. The success of that experiment made it a demonstration; and the organization of work and working agency which proved its efficiency in this demonstration is coming to be the prevailing type for the West Indies. For a detailed account of the demonstration in British Guiana, see *Publication No. 1* of the International Health Commission.

The single territorial unit of operations under this plan is a small, well-defined area containing a population of about 15,000. The plan of operation for this unit area comprises two undertakings, each with its own agency: the agency for the maintenance of which the International Health Commission contributes funds undertakes to treat until cured all persons within the area who are found infected; and the Government with its sanitary organization undertakes to make effective such sanitary measures as will prevent reinfection. The scheme for treating the infected requires: mapping the territory, locating roads, streams, villages, houses; taking a census of the population, numbering the houses in which the people live, recording name, age, sex,

race, and post-office address; making microscopic examination of the entire population; putting under treatment all persons found infected with *Uncinaria*; and continuing microscopic examination of each patient under treatment after each weekly course of medicine until a cure is effected.

The staff required to operate this scheme for the one area consists of a doctor,—called field director,—in charge; a clerk; three microscopists; six or eight nurses, each with an understudy; and three office employees. While this force is engaged in treating the infected population of this area, the Government sanitary staff is putting into operation a system of latrines designed to put a stop to soil-pollution.

The whole working organization is under the direct supervision of the Surgeon-General or of the State Director, who gives his whole time to the work. As it becomes desirable to enlarge the work, the units of operation may be multiplied at will by increasing the funds and training the required staff.

IV

WORK WHICH THESE ORGANIZATIONS ARE DOING

1. **Treating the infected:**—In all these countries the work is organized with a view to centering first effort on measures of relief,—that is, on

treating the people who are found infected. To quote the late Dr. C. W. Branch, of St. Vincent: "The measures for the prevention of hookworm disease fall into two groups: (1) the attempt to suppress or diminish the existing human infection; (2) the attempt to prevent new infections,—(a) by avoiding the pollution of the soil and water, and (b) by guarding individuals from infection. Of these the first is the more important and easier. The measures of the second group are necessary, but will be unavailing in the absence of the first." Perhaps one should not go so far as to say that measures of immediate relief of the infected are more important than measures of sanitary control, which in the end bring permanent relief; but the experience of the Anæmia Commission in Porto Rico and the larger experience of the Rockefeller Sanitary Commission in the Southern States demonstrate that in any effective plan of operation the treatment of the people is the easier entering wedge.

Systematic treatment is justifiable if only as a means of relieving suffering and inefficiency. By treatment alone the working efficiency of the laborers on coffee plantations in Porto Rico was increased from 30 to 50 per cent, and on some estates was doubled. By treating the people who came voluntarily to the dispensaries the general average of the hæmoglobin index, as

estimated for the total population over a large area where the test was made, was raised from 43.09 in 1904 to 72.22 in 1914. On many large rubber estates in Malaya, where the infection is prevalent, and where soil-pollution is general, little or no anæmia can be detected—the result of systematically sending to hospital for treatment all cases showing clinical symptoms. Treatment also tends to lessen the spread of infection by curing the carriers. If all the carriers were cured and kept cured for the space of a year, the disease would be under control. But the chief advantage to be derived from systematic treatment of the people on a large scale as a first step toward final control is that this is a most effective means of popular education. The work, if properly conducted, teaches the people by demonstration what the disease is, and what it means to them as a menace to health and working efficiency; it teaches them how they get it and how they may prevent it, and thus enlists their interest in carrying out the sanitary measures which are necessary for the control of the infection. As a result of this educational work in British Guiana the villages are now voluntarily contributing toward the maintenance of the inspectors employed by Government to carry out the sanitary measures required to prevent contamination of the soil.

Within the brief period during which the work has been in operation in these countries 19,425 persons have been treated. The significance of this result is to be stated not primarily in medical terms, as the relief of 19,425 people; but in educational terms, as the instructing and moving to action of a much larger number of people. For every person successfully treated becomes the effective teacher of a circle of friends and neighbors.

2. **Infection survey:**—Effort is being made in each country concerned to carry out a survey to determine the geographic distribution of the infection, and to estimate the degree of infection for each infected area. The survey is based on microscopic examination of stools. The information thus gained has a threefold value: it locates and defines the problem which the Government has to face in attacking the disease; it gives the people an incentive and basis for helpful co-operation; and by making a similar survey from time to time, it gives a definite measure of progress in the work of control.

In most of the countries the infection survey is conducted in connection with the other regular work and calls for no special provision to carry it out. In Antigua, where doubt existed as to the prevalence and seriousness of uncinariasis, Dr. Eric Marshall was employed

to make a systematic survey of the Island before inaugurating work for the relief and control of the disease. In addition to the examination of stools, blood tests were made to determine the degree of anæmia which the infection was producing. The survey located the infection and defined the areas in which it is now proposed to institute measures for the control of the infection. In Egypt the survey has been completed for Sharqia Province and shows that not less than 56 per cent of the male population are infected. The survey in British Guiana, based on an examination of the total population in Peters' Hall District, shows an infection of 57 per cent. The examinations in the other countries show the percentage of infection for the areas surveyed as follows: in St. Lucia about 68 per cent; in Grenada 54 per cent; in Panama (including Panama City) 54 per cent,—in the interior of Panama 63 per cent; and in Costa Rica 83 per cent.

3. **Hæmoglobin test:**—In connection with the work in Antigua, Egypt, and Panama, a number of blood examinations have been made with a view to determining roughly the degree of anæmia which the infection is producing. In Antigua, Dr. Marshall made blood examinations to determine the hæmoglobin percentage in 259 infected cases and 15 uninfected cases.

The record of results indicates that the degree of anæmia being produced by uncinariasis among the negro population of that island is relatively slight. Of the 259 infected cases examined only 13 cases show a hæmoglobin index as low as 60 per cent, with three cases dropping to 10 per cent; in 246 cases the index is 70 per cent or above; in 191 cases it runs as high as 80 per cent; and in 44 cases it reaches 90 per cent. Of the non-infected cases, however, none shows a hæmoglobin index below 80 per cent. Or, to exhibit the contrast in another form: of the infected cases only 72 per cent show an index as high as 80 per cent, while some of these cases drop to 60 per cent, 50 per cent, 40 per cent, and three cases to 10 per cent.*

In Panama Dr. Hackett made hæmoglobin tests of 813 infected cases. The record of results indicates that uncinariasis is producing a greater degree of anæmia among the Indian and mixed population of Panama than among the blacks of Antigua. Of the 813 cases examined 522, or about 56 per cent, show a hæmoglobin index ranging from 10 per cent to 70 per cent, with 15 cases running as low as 10 per cent.†

In Egypt Dr. MacCallan made blood examination of 6,256 infected cases and of 706

*See summary for Antigua.

†See summary for Panama.

cases taken at random from schools and ophthalmic hospitals. Of the 6,256 infected cases, 4,336, or nearly 70 per cent, show a hæmoglobin index ranging from 10 per cent to 50 per cent; 489 cases give an index as low as 20 per cent, and 246 cases drop to 10 per cent. Of the 706 cases taken at random without regard to infection, only 54, or less than 8 per cent, show an index as low as 50 per cent.* The anæmia which uncinariasis is producing among the fellahin in Egypt seems to be more severe than in Panama or in Antigua.

4. Preventive measures:—The organization in each of the eleven countries is conducting a sanitary survey to determine the existing conditions responsible for the presence and spread of uncinariasis in the infected areas. In Egypt, where the absence of ground-itch has given rise to doubt as to whether the infection is transmitted chiefly through the skin or by the mouth, this survey has for its object: (1) to ascertain how the infection is transmitted among the fellahin; and (2) to locate the danger-points about the Egyptian village from which the infection is spread. The final purpose of the survey in Egypt, as in all the other countries, is to lay the basis for a system of sanitary measures designed to bring the disease under control.

*See summary for Egypt, pages 71 and 72. In interpreting the results of these hæmoglobin tests one must take into account bilharziasis in Egypt and malaria in Panama.

In Costa Rica the Government has enacted a law requiring the construction and maintenance of privies which provide for the disposal of the night-soil in such manner as to protect the soil from contamination. An appropriation of \$11,000 per year has been made, and is now available for the purpose of making this law effective. The organization which conducts the work of examining and treating the people, serves also as a sanitary force in administering this law. The work of sanitation is being carried out in the areas in which the work of treatment is in progress. In other words, the one working organization selects an area for operations; makes an infection survey to determine the degree of infection in this area; gives treatment without cost to all persons found infected, who desire treatment; inspects privy conditions at the homes and about public places; and, wherever unsatisfactory privy conditions are found, proceeds under the law to have the conditions remedied.

The sanitary work which is being done in British Guiana is especially significant, because of its thoroughness and because of what it promises for the future. As already stated, the first work undertaken in this Colony was undertaken frankly as an experiment, the purpose being to approximate as nearly as practicable

complete relief and control of uncinariasis within a given area. It was understood that the Commission would supply funds for examining and treating the people and that the Government would undertake to prevent reinfection. The demonstration has been as thoroughgoing in its work of sanitation as in that of treatment. The area in which the demonstration has been carried out contains a number of free villages, the populations of which comprise East Indians, Negroes, Portuguese, and mixed breeds. These people have been brought to provide and to use latrines, so that the soil in these villages is now protected from contamination. And, better still, the educational effect of the whole work has been such that the villages are now voluntarily contributing toward the maintenance of a system of sanitary inspection to keep their condition up to the standard that has been set.

The service is now being extended to other areas on the same basis. The plan of work here adopted providing for intensive work in well-defined areas, with the local Government undertaking to prevent reinfection, has some advantages that are worthy of special note: the work is definite and thorough and gives one a sense of accomplishment that closely approximates completeness; the sanitary work keeps pace with the work of treatment and cure, and thus gives one

a sense of results that are lasting; it enables the Government to begin a definite sanitary work on the basis of an almost insignificant expenditure, and to train and enlarge its sanitary force gradually as the work is extended from area to area, and as the people are educated to the point of more and more helpful coöperation.

5. Educating the people:—This whole work is essentially educational: it is teaching the people by demonstration. The field directors carry the work out among the people. They tell the story of this disease in varied graphic forms and in terms so simple that the common man, though he be illiterate, may see and understand. In the Southern States the schools and the public press were enlisted and large use was made of pamphlets, leaflets, and circular letters. These agencies are not being neglected in the foreign field; but among the natives in many of the tropical countries the story must be presented in more direct and concrete terms. Here the field directors rely more upon telling the story by word of mouth; and as they tell it they illustrate its details by means of lantern-slides, photographs, and objects. They use typical cases as object-lessons; they point out the gross clinical symptoms in these cases (and these the people soon learn to recognize); they get specimens of the patients' stools and exhibit the

eggs of the parasite under the microscope; they show the parasites that have been expelled by the treatment administered; and by means of the microscope they exhibit the living, squirming embryos that live by teeming thousands in the soil that has been befouled by an infected person, and are ready to infect any person with whose bare skin they come into contact. The recovery that follows treatment and cure tells its own story, both to the patient and to his friends and neighbors. The disease thus lends itself so readily to simple demonstration that the people—even native populations of tropical countries—easily understand its whole story. They learn to recognize the disease by its clinical picture; they have seen the parasite that causes it, and the eggs by which infection is demonstrated; and they see how the infection is spread and how it may be prevented. As a result of this educational work, the people coöperate helpfully, in both the work of treatment and that of prevention. A recent communication from British Guiana says: "It is gratifying to report that the authorities of the various villages of Areas A and B in the Peters' Hall District have so thoroughly realized the benefit obtained from the expulsion of hookworm, and have so carefully realized the principles of reinfection, and the necessity of its prevention, that they have subscribed the neces-

sary amount to maintain a Sanitary Inspector to devote his full time to their District."

The relief and control of this one disease is an object-lesson in the relief and control of disease in general. This one is simple and tangible; the common man can easily understand what it is, and what it means to him as a menace to his health and to his earning power; he knows its whole story; he knows its simple treatment and its one simple preventive measure. Having seen this one disease brought under control and having had the worth of the effort brought home to him, he is prepared to give heed when spoken to about the control of diseases that are less simple and less tangible. To repeat, then, for the sake of emphasis, this whole work is essentially educational; and its best result is in securing the helpful coöperation of the people in the work of bringing this disease and all other preventable diseases under control.

CHAPTER II

SUMMARY OF ACTIVITIES AND RESULTS BY TERRITORIAL UNITS

BRITISH GUIANA

1. **Inauguration of work:**—The work in British Guiana was the first to be opened in foreign countries with the coöperation of the International Health Commission. Successful operations against uncinariasis on the sugar estates had already been conducted by the local government under the direction of the Surgeon-General. The Commission was invited to coöperate in trying out an experiment which had not been possible with the means available. It was proposed to approximate, as nearly as practicable, complete eradication of the disease within a selected area, this area to include free villages as well as plantations. Up to this time no attempt had been made toward relief or control of the disease in the villages.

Plans were adopted for beginning operations on a small scale, with a limited budget, and for extending the operations and increasing the budget as the results seemed to justify. The Surgeon-General designated Dr. Ferguson to have

immediate supervision of the work. A scheme for conducting the work was then drawn up by Dr. Ferguson. The Peters' Hall District, lying on the east bank of the Demerara River, near Georgetown, was chosen for the preliminary operations. This was divided, for the sake of convenience, into three areas, known as A, B, and C. Area A, the most populous, having 3,984 inhabitants, occupies the smallest territory, and is nearest to Georgetown; Area B, with 3,562 inhabitants, is more scattered and more distant from Georgetown; while Area C, with 2,832 inhabitants, is the most scattered and distant of the three.

Operations were started first in Area B, under a budget prepared by Dr. Ferguson, and adopted by the Commission, February 13, 1914. This called for a contribution of \$7,244.70 by the International Health Commission. The Surgeon-General and Dr. Ferguson, thinking that the experience of the Rockefeller Sanitary Commission in the Southern States would be of value in beginning work in British Guiana, requested the Commission to lend one of its substitute directors to aid in conducting operations. The Commission, in granting the request, assigned the mission to Dr. H. H. Howard, who arrived in British Guiana, March 9, 1914.

2. **Activities and results:**—In the beginning, during the experimental stage of the work, only one village—Agricola—with a population of 1,330, was dealt with. When the results of the campaign in this village indicated that the methods employed were feasible, the work was rapidly extended to embrace the whole of Area B. With the experience gained in the campaign in Area B, budgets were prepared, submitted to the Commission upon the return of Dr. Howard to the United States, and adopted on August 13, 1914. These provided \$4,566.00 quarterly for continuing the work in Area B, and for extending it to Areas A and C.

The work in Area B was started in the latter part of March, 1914. It was to have been completed December 31, 1914. In this area the daily dose of ten grains was used in the treatment of those infected, and it was for this reason that this campaign has been extended over a period of several months. On December 31, 1914, it was found that there still remained more than 200 cases not yet cured by the daily dose, and for the sake of economy these were put upon the weekly large dose of thymol for more speedy cure. In Areas A and C the weekly large dose of thymol was the method of treatment adopted, and this method will be adhered to in future work.

Operations in Area C were started in September, 1914.

In Area A there was an interruption to the campaign owing to radical sanitary work in progress, a relocation of streets, and other improvements, which delayed the beginning of treatment until November, 1914.

All work in this colony has been conducted under what is termed the intensive method, which requires:

1. Operation within a definite area.
2. Enumeration of the entire population in this area.
3. Examination of the entire population.
4. Treatment of all found infected with uncinariasis.
5. Careful re-examination of every patient under treatment after each weekly course of medicine, until a cure is effected.

All treatments are given in the homes of the people, under the supervision of nurses employed for this purpose.

Representative citizens of the District deemed the campaign to be so effective and beneficial that on June 29, 1914, on the eve of Dr. Howard's return to the United States, the following resolution was unanimously adopted by a mass meeting of the residents:

"WHEREAS, we, the inhabitants of the Peters' Hall District on the East Bank, Demerara River, County of Demerara, and Colony of British Guiana, being fully convinced of the disastrous effects of the Hookworm (*Ankylostome*) when found in the human system, beg to record our warmest appreciation of the efforts of the Rockefeller International Health Commission in our midst for the purpose of eradicating these dangerous parasites; and ask Dr. Howard to convey to Headquarters our profound gratitude for their benevolent endeavors in this direction.

"We further beg to offer our unstinted coöperation and support with the hope that abundant success will be the ultimate result."

The following is a brief summary of the work accomplished in Areas A, B, and C, up to December 31, 1914:

RECAPITULATION

Census, entire district	10,378	
Not located and examined	897	
Number examined	9,481	
Number infected	5,562	
Number removed from areas of operation	659	
Number remaining for treatment	4,903	
Cured to December 31, 1914	3,701, or	75.5%
Remaining under treatment	975, or	19.8%
Refused or abandoned treatment and remaining within the district as foci of infection	219, or	4.5%
Died during campaign: death not connected with thymol administration	8, or	.1%
	4,903, or	100%

Total Expenditures to December 31, 1914	
For supervision by Dr. Howard during inauguration of campaign.....	\$1,445.95
Expenditures as rendered from Field Director.....	<u>7,274.10</u>
Total.....	\$8,720.05

This is a per capita cost for those examined of approximately \$.91. The continuation of the 975 under treatment in the district will not materially increase this expenditure.

The following is a more detailed report of the results of the campaign in Peters' Hall District up to December 31, 1914:

	TOTAL	AREA A	AREA B	AREA C
Census	10378	3984	3562	2832
Number in census not traced or located in examinations*	897	465	356	76
Number examined	9481	3519	3206	2756
Number infected	5562	1731	1918	1913
Number removing from areas †	659	284	191	184
Before treatment	343	228	41	74
After one or more treatments	316	56	150	110
Number remaining in district not treated	219	90	57	72
Number refusing treatment	11	9	1	1
Number not treated on medical grounds	147	78	—	69
Number abandoning treatment	61	3	56	2
Number under treatment	975	579	248	148
Number cured	3701	777	1415	1509
Number died ‡	8	1	7	—

* These were mainly transients, and parties residing outside the area, who represented themselves as residents to secure treatment.

† As the intensive method provides that we deal only with the population of the areas of operation, those removing are eliminated from the local campaign.

‡ Death not connected with thymol administration.

Peters' Hall District
Area B

	TOTAL FOR AREA B	AGRICOLA	ECCLES	BAGOTS- TOWN	PETERS' HALL	PROVI- DENCE PASTURE
Census	3562	1330	343	782	718	389
Number in census not traced or located in examinations*	356	120	10	101	72	53
Number examined	3206	1210	333	681	646	336
Number infected	1918	635	261	393	386	243
Number removing from area†	191	70	22	58	27	14
Before treatment	41	14	5	10	9	3
After one or more treatments	150	56	17	48	18	11
Number remaining in district not treated	57	24	3	11	13	6
Number refusing treatment	1	—	—	—	1	—
Number not treated on medical grounds	—	—	—	—	—	—
Number abandoning treatment	56	24	3	11	12	6
Number under treatment	248	59	25	43	67	54
Number cured	1415	480	210	279	278	168
Number died‡	7	2	1	2	1	1

*These were mainly transients and parties residing outside the area, who represented themselves as residents to secure treatment.

†As the intensive method provides that we deal only with the population of the area of operation, those removing are eliminated from the local campaign.

‡Death not connected with thymol administration.

Peters' Hall District
Area C

BRITISH GUIANA

	TOTAL FOR AREA C	MOCHA	ARCADIA	COVENT GARDEN	PROSPECT	DIAMOND FRONT	BIG GROVE	LITTLE GROVE	CRAIG	HOPE
Census	2832	256	189	359	82	80	1129	399	310	28
Number in census not traced or lo- cated in examinations*	76	12	13	11	2	2	18	13	5	—
Number examined	2756	244	176	348	80	78	1111	386	305	28
Number infected	1913	148	124	223	41	56	829	281	191	20
Number removing from area †	184	7	4	21	4	1	116	14	16	1
Before treatment	74	3	1	10	2	—	42	10	6	—
After one or more treatments	110	4	3	11	2	1	74	4	10	1
Number remaining in district not treated	72	5	13	6	1	6	22	11	6	2
Number refusing treatment	1	—	—	—	—	—	1	—	—	—
Number not treated on medical grounds	69	5	13	5	1	6	20	11	6	2
Number abandoning treatment	2	—	—	1	—	—	1	—	—	—
Number under treatment	148	4	1	—	—	7	104	27	5	—
Number cured	1509	132	106	196	36	42	587	229	164	17
Number died ‡	—	—	—	—	—	—	—	—	—	—

*These were mainly transients and parties residing outside the area, who represented themselves as residents to secure treatment.

†As the intensive method provides that we deal only with the population of the area of operation, those removing are eliminated from the local campaign.

‡Death not connected with thymol administration.

Peters' Hall District
Area A

	TOTAL FOR AREA A	LA PEN- TENCE	ALEX- ANDER VILLE	MEADOW BANK	HOUSTON FRONT
Census	3984	1486	1904	520	74
Number in census not traced or located in examinations*	465	244	164	53	4
Number examined	3519	1242	1740	467	70
Number infected	1731	578	836	277	40
Number removing from area †	284	111	127	41	5
Before treatment	228	85	107	34	2
After one or more treatments	56	26	20	7	3
Number remaining in district not treated:	90	24	36	27	3
Number refusing treatment	9	—	—	9	—
Number not treated on medical grounds	78	24	36	15	3
Number abandoning treatment	3	—	—	3	—
Number under treatment	579	251	324	—	4
Number cured	777	192	349	208	28
Number died ‡	1	—	—	1	—

*These were mainly transients and parties residing outside the areas, who represented themselves as residents to secure treatment.

†As the intensive method provides that we deal only with the population of the area of operation, those removing are eliminated from the local campaign.

‡Death not connected with thymol administration.

The field director in his report of November 18, 1914, in commenting on the campaign in Peters' Hall District, says: "All the work recorded in this report has been carried on without interfering with the people's daily work." As to preventive sanitary measures, he says that on June 30, three and one-half months after the beginning of the work, "87 per cent of all the lots in the whole of Area B and Meadow Bank village had pit closets." Since then some few more have been added. "It is gratifying to report that the local authorities of the various villages of Areas A and B in the Peters' Hall District, have so thoroughly realized the benefit obtained from the expulsion of hookworm, and have so carefully realized the principles of re-infection, and the necessity of its prevention, that they have subscribed the necessary amount to maintain a Sanitary Inspector to devote his full time to their district."

3. **Extending the work:**—Plans have been laid for extending the work to the west bank of the Demerara River, which has likewise been divided into Areas A, B, and C. Budgets providing \$7,074.96 for these areas were adopted November 30, 1914. Work is expected to begin early in January, 1915.

4. **Preventive measures:**—From the standpoint of sanitation, the work in British Guiana

promises exceptionally favorable results. It was originally suggested that the International Health Commission supply the funds needed for treating and curing the disease and the local government undertake to prevent reinfection. The government appointed for this purpose a staff of native sanitary inspectors, trained in the sanitary institute of Georgetown. These subordinate inspectors are under the direct supervision of a chief sanitary inspector, brought out from England. One of the great advantages of an intensive campaign such as was waged in British Guiana is that, since the area operated in at first is small, only a small expenditure is required to provide the necessary sanitary force for inspection. As the work is extended from area to area, it is possible for the government to add to this force as the public becomes more enlightened and more interested in preventive measures.

The supervision of the subordinate sanitary officers is strict and consequently the service rendered is effective. The sanitary laws and regulations of British Guiana are not materially different from those in existence in other colonies, but they are probably more effectively enforced than is the case in many other countries. In every respect the work of sanitation has kept pace with that of treatment and cure; it is to be a

continuous and not a spasmodic effort; and it promises results of the most definite and lasting value.

ANTIGUA

1. **Organization of work:**—Following a conference between Sir H. Hesketh Bell, Governor of Antigua, and the Director-General of the International Health Commission, the Commission was invited to contribute funds for conducting a systematic investigation into the prevalence of uncinariasis in Antigua, with the understanding that measures for its control would be considered if the investigation showed the infection to be a menace to the health and efficiency of the people. A budget was prepared, submitted to the Commission, and adopted April 16, 1914. It provided \$3,774.25 for this investigation.

2. **Results to date:**—Dr. Eric Marshall was appointed by the British Colonial Office to conduct this investigation. He began work about August 1, and concluded November 27, 1914. The results of his work are summarized as follows:

(1). *Microscopic Examinations for Uncinariasis*

ESTATE DISTRICTS	EXAMINED	INFECTED	PERCENTAGE OF INFECTION
Lime Stone Area . .	547	36	6.5
Central Plain	689	84	12.1
Volcanic Area	486	156	32.0
Falmouth	20	0	0.0
English Harbour . . .	46	0	0.0
Urlins	13	0	0.0
Johnson Point	17	0	0.0
Five Islands and Galley Bay	21	0	0.0
Total for Estates . .	1839	276	15.0
INSTITUTIONS	EXAMINED	INFECTED	PERCENTAGE OF INFECTION
Prison	70	18	25.7
Poor House (Males) . .	39	1	2.5
" " (Females) . . .	57	5	8.7
Industrial School . . .	35	13	37.1
Hospital	247	60	24.2
Lunatic Asylum . . .	48	22	45.8
Local cases	158	11	6.9
Bishop Matthews School	221	6	2.71
Total for Institutions .	875	136	15.5
Total for Estates . .	1839	276	15.0
Grand total for Estates and Institutions	2714	412	15.1

(2). *Blood Examinations*

Hæmoglobin Examination of 259 Infected Cases

PERCENTAGE BY HÆMOGLOBIN SCALE WITHIN 10% LIMIT	NUMBER OF CASES EACH 10% OF SCALE	PERCENTAGE OF CASES EACH 10% OF SCALE
90% plus	44	16.99
80% "	147	56.75
70% "	55	21.23
60% "	4	1.54
50% "	4	1.54
40% "	2	.77
10% "	3	1.15
Total	259	

Hæmoglobin Examination of Fifteen Uninfected Cases

PERCENTAGE BY HÆMOGLOBIN SCALE WITHIN 10% LIMIT	NUMBER OF CASES EACH 10% OF SCALE	PERCENTAGE OF CASES EACH 10% OF SCALE
90% plus	1	6.66
80% "	14	93.33
Total	15	

Total Counts of Red Cells per Cubic Millimetre

	NO. OF PERSONS	P. C. OF WHOLE	
1 to 2 million per cmm.	1	1.11%	Number of total counts, 90. Lowest per cmm. 1,770,000
2 to 3 " " "	6	6.66%	
3 to 4 " " "	14	15.5%	
4 to 5 " " "	69	76.6%	
Total examined .	90		

Differential Blood Counts

DISTRICTS, ETC.	NO. OF CASES EXAM'D	AVERAGE EOSINO- PHILIA	
Lime Stone Area . .	1	8.0%	Total differential counts . . . 80 Highest Eosino- philia recorded 39%
Central Plain . . .	15	7.7%	
Volcanic Area . . .	15	12.93%	
Public Institutions .	39	12.07%	
Local	3	10.16%	
Matthews School . .	7	9.9%	
Total	80		

3. **Extending the work:**—Dr. Marshall draws the following conclusions from his preliminary survey:

“1. In certain districts a large percentage of the population are suffering from ankylostomiasis.

“2. It is the cause of much sickness at the present time.

“3. Under certain conditions it might become a menace to the health of the whole island.

“4. At the present time, owing to its distribution, it can be readily dealt with by an intensive campaign.

“5. It is in some districts of considerable economic importance to the planters.

“6. It is of vital importance to a large percentage of the labouring population.”

As a result of the survey work, disclosing an infection of approximately 15 per cent, plans are being prepared providing for systematic work for the relief and control of the infection in the infected areas. Dr. Marshall has recommended that laws be passed for the compulsory examination and treatment of all inhabitants, and the construction and maintenance of suitable latrines for the prevention of reinfection. The legislature will meet in February, and will consider at that time the passage of such laws.

TRINIDAD

1. **Inauguration of work:**—The plan for work in this island was drawn up by Surgeon-General

H. L. Clare, approved by the English Advisory Committee, and submitted to the International Health Commission. It was adopted on February 27, 1914. The sum of \$12,978.55 was made available for carrying on the work. The operations are conducted under the general supervision of the Surgeon-General.

2. **Results:**—Colonel J. R. Dodd, M. D., D. P. H., was appointed Medical Officer in Charge, June 13, 1914. He arrived in Trinidad early in August. Actual work was started August 11th, with San Fernando as the headquarters and central laboratory. Branch laboratories have been established at Couva, Princes Town, and LaBrea.

The following is a summary of the work accomplished from August 11, through December 31, 1914, for all of the laboratories combined:

Number of persons examined.....	4528
Number of persons treated.....	1635
Number of persons cured.....	270*

3. **Sanitary survey:**—A partial sanitary survey has been made in the localities where work has been carried on. Of 1636 premises inspected, 664 had no latrines. The following table indicates the types of latrines in use:

*It is the custom to administer from one to three treatments. These treatments generally produce cures. For determining positively which cases have been cured, a microscopic re-examination is required from two to eight weeks after treatment. Often this re-examination is not feasible. Consequently, the number of persons recorded as cured is reduced.

Trenches.....	96
Cesspits.....	679
Pails.....	129
Shed only.....	68
No latrines.....	664
Total.....	<u>1636</u>

4. **Extending the work:**—The difficulty of securing trained medical officers from England during recent months has retarded the development of the work in this island. The authorities, however, have invited the Commission to delegate from its staff of substitute directors men to fill the vacancies temporarily, until English medical officers are available. Arrangements are being made to lend this assistance.

ST. LUCIA

1. **Inauguration of work:**—Dr. S. Branch is in charge of measures against uncinariasis in this colony, and serves under the general direction of an Advisory Committee appointed by the Island Government. The budget, providing \$6,145.94, was adopted April 16, 1914.

2. **Results to date:**—A preliminary investigation into the distribution and prevalence of the infection was conducted up to December 31, 1914, with the following results:

	EXAMINED	INFECTED	TREATED
Castries (town)	211	97	97
" (rural)	221	147	147
Babonneau and Gros Islet	55	45	45
Cul de Sac Valley . . .	50	41	41
a. Crown Lands . . .	22	19	19
b. Ferrands	12	12	12
c. Soucis	96	82	82
d. Forestier	40	33	33
Roseau Valley and beyond	43	36	36
Total	750	512	512

3. **Extending the work:**—A new budget, providing \$1,609.10 has been adopted for carrying on an intensive campaign of eradication in the Cul de Sac valley. This intensive work is scheduled to begin January 1, 1915.

4. **Preventive measures:**—The Administrator reported December 11, 1914, that every effort will be made to secure the enactment and enforcement of the regulations suggested by Dr. Howard, Director for the West Indies, for the improvement of sanitation in St. Lucia.

ST. VINCENT

The budget, providing \$5,590.76, was authorized April 16, 1914.

Dr. Cyril H. Durrant is Director in Charge. The plan of campaign was formulated by the Administrator, Douglas Young, Esq.

No work was done in St. Vincent in 1914, owing to the fact that Dr. Durrant was not

relieved from Hospital duties, no successor being available.

GRENADA

1. **Inauguration of work:**—A budget, providing \$9,038.72 for conducting work on this island, was adopted April 16, 1914. Dr. Angus MacDonald was appointed Director and assumed his duties August 28th.

Up to the close of the year a survey had been conducted through the schools; the support of influential persons was sought and obtained; literature was distributed and addresses were delivered; and other preliminary arrangements were made. Actual work was started December 1st. Head offices were established at Marine Villa, with branches at Mount Moritz, Gouyave, Birchgrove, and St. Dominic's.

2. **Results:**—The report through December 31, 1914, gives the following results:

(1). *Examinations and Treatments*

	EXAMINED	INFECTED	TREATED
Mount Moritz	223	153	116
Gouyave	192	94	161
Birchgrove	226	115	150
St. Dominic's	240	140	189
Head Office	624	312	143
Institutions . . . . .	...	...	399
Total	1505	814	1158

(2). *Blood Examinations*

	TOTAL NUMBER	PERCENTAGE EOSINOPHILES
Blood examinations	100	Mean 9.37*
Hookworm infection	44	10.5
Other infections	51	8.4
Not infected	5	7.5

Dr. MacDonald draws the following conclusions from his work to date:

"1. There is a high rate of hookworm infection in Grenada.

"2. All classes (practically), both sexes, all ages, are infected.

"3. Present methods of examination indicate an infection of ankylostomiasis to the amount of 74 per cent of the white peasant settlers in one district, and 64 per cent of the black population in another. With improved methods of examination, there is no doubt the infection will be shown to be even higher than this.

"4. A definite amount of debility, chiefly anæmia, cardiac dilatation and chronic dyspepsia prevails, especially in the more highly infected districts.

"5. Dwarfism and infantilism are found amongst those infected, both white and black; but other causes of these conditions are probably operative, and the result of treatment must be awaited before definite conclusions can be drawn.

"6. The mode of infection is from the soil (mainly).

"7. Drinking of polluted water is general, and the resulting dysenteric diseases complicate and are complicated by ankylostomiasis.

"8. The blood examination carried out in the laboratory of the Commission has revealed infection by the malarial parasites in different areas, which also complicates diagnosis and treatment of ankylostomiasis and makes difficult any correct allocation of morbid conditions to the causative disease."

*Range from 1 to 30.3.

3. **Extending the work:**—Dr. MacDonald has planned to extend the work, beginning January 1, 1915, on the intensive plan. For this purpose three areas have been selected: two at St. David, known respectively as Area A and Area B, and one at Mt. Moritz Centre. Area A at St. David has a population of approximately 3,069; Area B, 3,260; and the area at Mt. Moritz Centre, 3,557.

4. **Preventive measures:**—The local Government has been petitioned to pass laws providing for the construction and maintenance of sanitary latrines. If such laws are enacted, Dr. MacDonald will be able to supplement his work of examination, treatment, and cure with sanitary improvements designed to prevent reinfection.

JAMAICA

Upon hearing of the measures conducted in adjacent colonies for the relief and control of uncinariasis, the Government of Jamaica on April 3, 1914, expressed a desire through the Colonial Office in London, that the Commission be asked to send a representative to consider coöperation in relief measures in that island. The invitation has been accepted and the Director for the West Indies will visit that island in February, for the purpose of investigating the prevalence of the infection, with a view to considering coöperative plans for its control.

PANAMA

1. Inauguration of work:—The participation of the International Health Commission in relief measures against uncinariasis in Panama had its inception at a dinner at the Pan-American Building, in Washington, D. C., on the evening of February 15, 1914. The dinner was attended by diplomatic representatives of the various Central and South American governments. The work of the Rockefeller Sanitary Commission in the Southern States was outlined by the Director-General and the method proposed by the International Health Commission of co-operating with local governments elsewhere along similar lines was presented.

The Government of Panama thereupon asked the Commission to lend assistance for conducting operations in that Republic. The invitation was accepted April 28, 1914. It was agreed that the work be carried on as a subdivision of the National Department of Health. In accordance with plans agreed upon a Director was appointed to have immediate charge of the work. Dr. L. W. Hackett was appointed Director, April 1st, and arrived in Panama May 14, 1914.

Following a series of conferences between the Government officials and Dr. Hackett, a preliminary annual budget was prepared, submitted to the Commission, and adopted July 1, 1914.

This provided \$15,038.50 for conducting the work. The Republic of Panama is furnishing offices and other facilities, as well as the medicine needed for treatment.

2. Results:—The first weeks were devoted to securing supplies from the States; conferring with the Government officials; conducting preliminary surveys; and attending to various routine matters connected with the inauguration of the campaign. Actual work was started about July 15th. Preliminary operations were begun in the City of Panama; and subsequently extended to Chorrera, Arraijan, Capira, and Bocas del Toro, villages in the interior.

The dispensary plan followed by the Rockefeller Sanitary Commission in the Southern States was adopted. This plan has three main features: (1) examinations and treatments; (2) infection survey; and (3) sanitary survey; with the special addition for the Panama work of a record of (4) blood examinations. The following is a summary of results accomplished through December 31, 1914.

(1). *Examinations and Treatments*

DISTRICT	PROVINCE	EXAMINED	INFECTED	TREATED
Panama .	Panama .	928	218	215
INTERIOR				
Chorrera .	Panama .	812	639	562
Arraijan .	Panama .	582	511	494
Capira . .	Panama .	987	830	677
Bocas del Toro . .	Bocas . .	2012	709	614
Totals for Interior only		4393	2689	2347
Totals for Panama City		928	218	215
*Grand totals . . .		5321	2907	2562

(2). *Infection Survey*

(Children 6 to 18 Years)

DISTRICT	PROVINCE	EXAMINED	INFECTED	PERCENTAGE OF INFECTION
Panama .	Panama .	804	196	24.4
INTERIOR				
Chorrera .	Panama .	390	321	82.4
Arraijan .	Panama .	210	196	93.3
Capira . .	Panama .	340	316	93.0
Bocas del Toro . .	Bocas .	695	297	42.8
Totals for Interior only		1635	1130	69.1
Totals for Panama City		804	196	24.4
†Grand Totals . . .		2439	1326	54.4

*These figures are not representative of the country at large, owing to the inclusion of Panama City, where the infection is lighter than in the interior.

†Note that the infection is much lighter in Panama City than in the interior villages of Arraijan and Capira.

(3). *Sanitary Survey*

DISTRICT	PROVINCE	REMARKS ON SANITATION
Panama .	Panama .	Every house connected with a sewer (in city limits).
INTERIOR		
Chorrera .	Panama .	Seven pit privies in town; Government planning to introduce sanitation.
Arraijan .	Panama .	No privies of any type; 8 public and 3 private in construction.
Capira . .	Panama .	One pit privy in town; public privies wanted by people.
Bocas del Toro	Bocas . .	Night-soil removal and disposal in ocean (imperfectly carried out by a few only).

(4). *Blood Examination*

DISTRICT	PROVINCE	HÆMOGLOBIN PERCENTAGE					
		0-10%	10-30%	30-50%	50-70%	70-90%	90-100%
Panama	Panama .	0	2	2	5	43	20
INTERIOR							
Chorrera	Panama .	9	23	70	55	28	0
Arraijan	Panama .	—	—	—	—	—	—
Capira	Panama .	0	2	41	65	14	1
Bocas del Toro .	Bocas . .	6	9	59	174	184	1
Totals . . . .	. . . .	15	36	172	299	269	22

3. **Extending the work:**—It is planned to extend the dispensary work from village to village until the whole country has been covered.

COSTA RICA

1. **Inauguration of work:**—Invitation by the Republic of Costa Rica to the International Health Commission to coöperate with that country in work for the relief and control of uncinariasis was extended on April 14, 1914. In conference between the President of Costa Rica, the Government Department of Health, and Dr. J. H. White, representing the Commission, a tentative working plan was formulated and agreed upon. This plan was approved by the Commission on July 1, 1914, and the sum of \$14,589.50 was appropriated for the work.

Dr. Henry R. Carter, Jr., was appointed temporarily as Director to have charge of the work.

2. **Activities and results:**—The first weeks were devoted to organization. The Director had to complete in detail working arrangements with the Government; he had to make preliminary surveys and to select the areas for first attack; he had to procure equipment and to select his local staff. Active operations began on September 23, 1914. Stations to which the people were invited to come for free examination and treatment were opened at Puntarenas,

Esparta, Chomes, and Miramar. Reports up to December 31, 1914, exhibit the following summary of results:

	EXAMINED	INFECTED	TREATED	CURED*
Puntarenas	2317	1510		
Esparta .	1260	1097		
Chomes .	191	179		
Miramar .	644	555		
Totals .	4412	3341	3341	179

An infection survey among children 6 to 18 years of age gave the following percentage of infection:

	EXAMINED	INFECTED	PERCENTAGE OF INFECTION
Total for country . . .	966	883	91.4

3. Preventive measures:—The sanitary code of Costa Rica requires that the people provide and use latrines to prevent contamination of the soil. On August 31, 1914, decree was issued by the Government making available the sum of \$11,000 to be used in making this law effective. The work of sanitation is being carried out in the areas in which the people are being examined and treated. The organization which administers the treatment undertakes also to inspect latrine accommodations and where conditions are found unsatisfactory to proceed under the law to have them remedied.

*See footnote page 57.

EGYPT

1. **Inauguration of work:**—Dr. F. M. Sandwith began the systematic treatment of uncinariasis at the Kasr el Ainy Hospital as early as 1887. For sixteen years the Church Mission Hospital in Cairo has been treating patients who come to it in increasing numbers from all parts of Egypt. This institution now has a special ward for uncinariasis and has 400 to 600 patients at one time under treatment for this disease. The Government Department of Public Health had instituted measures for the relief and control of the disease prior to the visit of the representative of the International Health Commission, in April, 1914. The Commission was asked to coöperate in making these operations more extensive and to make the demonstration more complete than was possible on the basis of local funds. Under instructions from the Director-General of the Department of Health, the local uncinariasis committee, consisting of Doctors Looss, Ferguson, Day, Todd, and Hastings, formulated a plan of operations for one year.

This plan proposed the Province as the unit of organization and of work. Egypt is divided into 14 provinces; Sharqia Province was selected as the territory within which to begin operations. Conditions in Egypt seem to make

it necessary to administer treatment to all patients under hospital conditions. The original plan for this Province provides for one large and four small traveling tent hospitals, and in the chief town of the Province a group of improvised house hospitals each accommodating about 30 patients. To these hospitals the people come for free examination and treatment. The plan provides also for an infection survey and a sanitary survey to be conducted as a special investigation. The budget calls for an annual expenditure of £12,000, one-half of this sum to be supplied by the Egyptian Government, and one-half by the Commission. The amount was reduced after the outbreak of the war in Europe to £9,000, this expenditure to be shared equally by the Government and the Commission.

2. **Activities and results:**—The results may be briefly summarized under the heads of hospital work and survey work.

a. **Hospital work:**—The work had been started with the opening of hospitals at Qaliub and Qalama in Qaliubia Province. On August 10th these two hospitals were closed and operations were transferred to Sharqia Province. In this Province hospitals have been opened at Belbeis and at Minia el Qamh. Cases are being treated also in the Murad Pasha Hospital at El Deir. The results for the five hospitals are exhibited in the following table:

(1). *Examinations, Treatments, and Cures*

PROVINCE	DISTRICT	No. of Persons EXAMINED	No. of Persons INFECTED	No. ADMITTED TO HOSPITALS	No. of Persons TREATED	No. of Persons RE-EXAMINED	No. of Persons CURED*
Qaliubia	Qaliub	5222	1973	2126	1686	139	138
Qaliubia	Qalama	688	561	518	459	—	—
Qaliubia	El Deir	2175	1503	1432	1383	267	226
Sharqia	Belbeis	3820	2675	2180	2013	514	467
Sharqia	Minia el Qamh	11905	6712	6256	5541	920	831
Total							

(2). *Blood Examinations*

PROVINCE	DISTRICT	HÆMOGLOBIN PERCENTAGE							
		1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%
Qaliubia	Qaliub	117	98	268	496	666	392	83	6
Qaliubia	Qalama	18	19	31	79	136	178	57	—
Qaliubia	El Deir	50	56	131	237	455	442	50	1
Sharqia	Belbeis	61	70	185	464	699	547	155	9
Sharqia	Minia el Qamh	246	243	615	1276	1956	1559	345	16
Total									
Total number of specimens taken									6256

* See footnote, page 57

b. Survey work:—Sharqia was the first province in which a systematic investigation was made of the prevalence of uncinariasis. Separate surveys were made (1) of the free population of the province; and (2) of the prisoners incarcerated in the jail at Zagazig. These are summarized below:

(1). *Among Free Population*

Prevalence of Uncinariasis

PROVINCE	POPULATION	EXAMINED	INFECTED	PER CENT.
Zagazig .	232,824	1,256	759	60.4
Minia el Qamh .	165,022	1,057	606	57.2
Belbeis .	140,396	1,096	546	49.8
Faqus .	124,486	868	514	59.2
Hehia .	110,164	939	622	66.2
Kafr Saqr .	106,556	868	364	42.0
Total .	900,000	6,082	3,411	56.08

Percentage of Hæmoglobin

Examinations made of the blood of 706 Egyptians from schools and ophthalmic hospitals gave the following results:

PERCENTAGE OF HÆMOGLOBIN	NUMBER EXAMINED	PERCENTAGE OF WHOLE
100-91	—	—
90-81	—	—
80-71	172	24.3
70-61	296	41.9
60-51	184	26.
50-41	40	5.6
40-31	10	1.4
30-21	1	.1
20-11	1	.1
10-1	2	.2
Total	706	

Prevalence of Bilharziasis

The following table indicates the percentage of bilharziasis among uncinariasis patients, as determined by microscopic examination of the urine:

PROVINCE	NUMBER EXAMINED	NUMBER INFECTED WITH BILHARZIA	PERCENTAGE INFECTED
Qaliubia: Nov. to April .	701	310	44.22
Qaliubia: May to Aug. .	1833	769	41.9
Qaliubia: Sept. to Nov. .	263	101	38.4
Sharqia:			
Minia el Qamh, Sept. to Nov.	1089	719	66.02
Belbeis: Sept. to Nov. .	832	590	70.9

Prevalence of Pellagra

The percentage of persons who gave clinical evidence of being afflicted with pellagra, among those examined for uncinariasis, is indicated below:

DISTRICT	POPULATION	EXAMINED	INFECTED	PER CENT.
Zagazig .	232,824	1,256	28	2.2
Minia el Qamh .	165,022	1,057	7	0.6
Belbeis . .	140,396	1,096	0	0.0
Faqus . .	124,684	868	56	6.4
Hehia . .	110,164	939	22	2.3
Kafr Saqr .	106,546	866	63	7.2
Total .	900,000	6,082	177	2.9

(2). *Among Prisoners in Zagazig Prison*
Prevalence of Uncinariasis

DISTRICT	EXAMINED	INFECTED	PERCENTAGE
Zagazig	78	46	58.9
Minia el Qamh	73	61	83.5
Belbeis	49	38	77.5
Hehia	54	43	79.6
Kafr Saqr	52	41	78.8
Faqus	35	25	71.4
Total	341	254	74.5

Prevalence of Pellagra

DISTRICT	EXAMINED	INFECTED	PERCENTAGE
Zagazig	78	1	1.2
Minia el Qamh	73	7	9.5
Belbeis	49	—	—
Hehia	54	5	9.2
Kafr Saqr	52	—	—
Faqus	35	—	—
Total	341	13	3.8

Prevalence of Bilharziasis

(Based entirely upon patients' statements; not upon microscopic examination of the urine)

DISTRICT	EXAMINED	INFECTED	PERCENTAGE
Zagazig	78	11	14.1
Minia el Qamh	73	11	15.0
Belbeis	49	6	12.2
Hehia	54	6	11.1
Kafr Saqr	52	12	23.0
Faqus	35	9	25.7
Total	341	55	16.1

Hæmoglobin Percentage

DISTRICT	INFECTED			NON-INFECTED		
	High-est	Low-est	Average	High-est	Low-est	Average
Zagazig	90	30	66.2	90	40	70.0
Minia el Qamh	90	35	62.7	95	45	68.0
Belbeis	85	10	60.0	80	40	60.0
Hehia	90	15	57.2	80	55	63.0
Kafr Saqr	90	30	65.6	90	50	74.0
Faqus	80	5	58.4	80	40	64.0
Total	90	5	60.0	95	40	66.5

A comparison of uncinariasis infection among prisoners from certain districts with that among the free population of the same districts:

DISTRICT	ZAGAZIG PRISON	SURVEY OF SHARQIA PROVINCE
Zagazig	58.9	60.4
Minia el Qamh . . .	83.5	57.3
Belbeis	77.5	49.8
Hehia	79.6	66.2
Kafr Saqr	78.8	42.0
Faqus	71.4	59.2

A comparison of hæmoglobin percentages from among the free population with those from among prisoners:

PERCENTAGE OF HÆMO- GLOBIN	AMONG FREE ADULTS		AMONG PRISONERS	
	EXAMINED	PERCENTAGE	EXAMINED	PERCENTAGE
100-91	0	.0	1	.2
90-81	5	.8	15	4.3
80-71	133	23.4	75	21.9
70-61	224	39.5	85	24.9
60-51	67	11.8	60	17.5
50-41	91	16.0	70	20.5
40-31	33	5.5	24	7.0
30-21	12	2.1	8	2.3
20-11	0	.0	1	.2
10-1	2	.3	2	.5
Total . .	567		341	

3. **Extending the work:**—The European war, by reducing the revenues of the Egyptian Government, has seriously retarded the development of the work in Egypt. It was hoped to operate at least six hospitals in each province simultaneously, but the lack of funds has limited the number to two. The hospitals established at Minia el Qamh and Belbeis in Sharqia Province will be continued until the number of patients presenting themselves for treatment has been materially reduced. At present this number is greater than can be accommodated. The work in Egypt will be extended from village to village, and from province to province, as rapidly as the results justify and the available funds will permit.

GENERAL SUMMARY

The following tables give a summary of results accomplished up to December 31, 1914. Table (1) shows the number of persons who were examined, treated, and cured, respectively, in the work of relieving sufferers. Table (2) shows the number of persons examined, but not treated, in the survey work for locating the infection. Table (3) gives the grand total of all persons examined, both in the work of relief and in the survey work.

(1). *Examinations and Treatments*

	TOTAL	BRITISH GUIANA	ANTIGUA	TRINIDAD	St. Lucia	St. Vincent	GRENADA	PANAMA	COSTA RICA	EGYPT
Examined	37902	9481	....	4528	750	...	1505	5321	4412	11905
Infected	21483	5562	....	1635	512	....	814	2907	3341	6712
Percentage Infected	56.6	58.6	....	36.1	68.2	....	54.1	54.6	75.7	56.3
Treated	19425	4676	....	1635	512	....	1158	2562	3341	5541
Percentage Treated	90.4	84.0	....	100.0	100.0	....	....	88.1	100.0	82.5
Cured*	4981	3701	....	270	....	....	....	....	179	831
Percentage Cured*	25.6	79.1	....	16.5	....	....	....	....	5.3	14.9

*See footnote page 57.

GENERAL SUMMARY

*(2). Infection Survey**

COUNTRY	EXAMINED	INFECTED	PERCENTAGE INFECTED
Antigua	2714	412	15.1
Egypt	6423	3665	57.0
Totals	9137	4077	44.6

(3). Grand Totals

	EXAMINED	INFECTED	PERCENTAGE INFECTED
In administering treat- ments	37902	21483	56.6
In infection surveys . .	9137	4077	44.6
Totals	47039	25560	54.3

*Includes persons of all ages; not those of school age only.

CHAPTER III
ILLUSTRATIONS

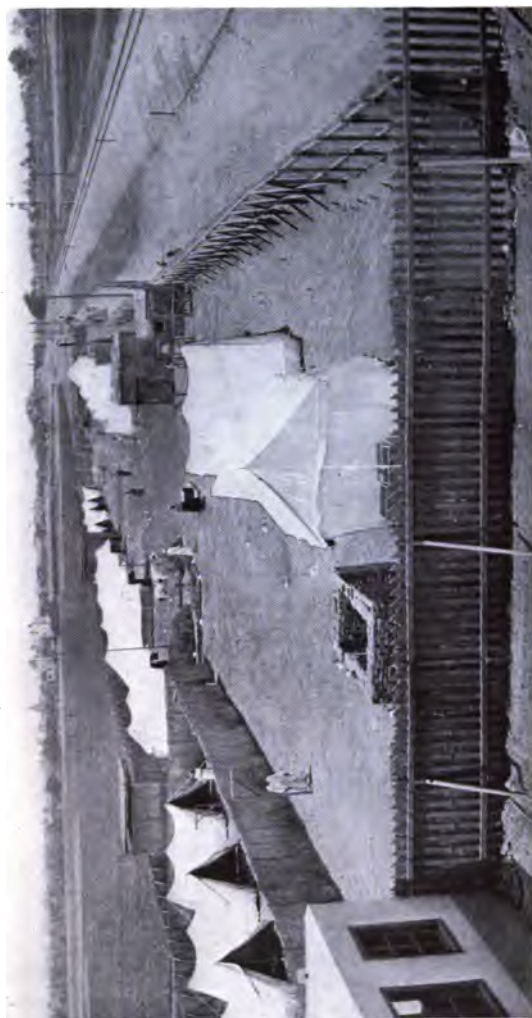


Fig. 1. Large traveling uncinariasis hospital, Qaliub, Egypt



Fig. 2. Patients taking thymol. Egypt



Fig. 3. Patients going to tents after thymolization. Qaliub, Egypt



Fig. 4. Typical cases uncinariasis, Egypt



Fig. 5. Typical cases uncinariae, Egypt



Fig. 6. Opening work, April 6, 1914, Agrícola Village, Demerara, British Guiana. (1) Dr. J. E. Godfrey, Surgeon-General, British Guiana; (2) Dr. K. S. Wise, Chief Bacteriologist (successor to Dr. Godfrey); (3) Dr. J. E. A. Ferguson, Government Medical Officer; (4) Dr. Minnett, Asst. Bacteriologist; (5) Mr. Bell, Sanitary Inspector; (6 and 7) Wajadalli and Viapree, East Indians, Microscopists; (8) Pioneer; (9) Trotman, Asst. Inspector; (10) L. W. Collins, American Consul; (11) Beni, East Indian, first patient; (12) Mahangoo, wealthiest East Indian citizen; (13) Dr. H. H. Howard, Sup. Med. Officer; (14) Village Councilmen; (15) first dispensary.



Fig. 7. Staff for the relief and control of uncinariasis in British Guiana



Fig. 8.
Severe case of uncinariasis. A Portuguese. British Guiana



Fig. 9.

Cured case, British Guiana. Had severe heart trouble as result of uncinariasis. Three weeks after treatment was able to run to show his marked improvement



Fig. 10. Widow and two children, East Indians, were not able to stand. Improving rapidly under treatment British Guiana



Fig. 11. Typical cases undnariada, Mt. Moritz, Grenada, B. W. I.



Fig. 12. Group of typical cases of uncinariasis, Costa Rica



Fig. 13. Cases of uncinariasis, Mt. Moritz, Grenada, B. W. I. Girl with hat on had been treated and cured



Fig. 14. Indian coolies. Infection severe, large number of anæmic sores. Estate Bten Venue, San Fernando, Trinidad, B. W. I.



Fig. 15. Group of cases of uncinariasis, barracks on sugar estate, at Roseau, St. Lucia, B. W. I.



Fig. 16. Cases of uncinariasis, St. Vincent, B. W. I.



Fig. 17. Group of cases of uncinariasis, Church Mission Hospital, Calro. About 600 under treatment on day this photograph was made

CHAPTER IV

FINANCIAL STATEMENT

The statement of expenditures presented on the following page shows that the Commission expended a total of \$157,731.08 during the eighteen months from July 1, 1913, to December 31, 1914. Of this amount \$34,038.79 was devoted to administrative work; \$3,108.15 being for property in the form of furniture and equipment, and \$30,930.64 for current expenses. On an annual basis this would represent approximately \$20,000 for current expenses, of which about \$5,000 represents expenditures for traveling purposes.

The \$14,113.14 used for educational and informational work was devoted to the collection of material, and the preparation and display of exhibits by the Department of Surveys and Exhibits; the development of the library and the printing and distribution of publications.

The \$109,579.15 used for the hookworm campaign in the field was expended partly out of special budgets adopted for work in foreign countries and partly directly out of the Commission's central office budget. The latter included items for the purchase of thymol, field equipment, travel expenses of directors in going to and in returning from the field, and salaries of directors of field work up to the time these were charged to special budgets.

General Statement of Expenditures for the Eighteen-Month Period from July 1, 1913, to December 31, 1914

GRAND TOTAL EXPENDITURES..... \$157,731.08

I. *For Administrative Work*..... 34,038.79

1. For current expenses..... \$30,930.64

- (1) Salaries (permanent)... \$17,006.08
- (2) Salaries (temporary)... 259.07
- (3) Rent..... 4,138.41
- (4) Traveling expenses.... 6,417.79
- (5) Office expenses..... 2,501.84
- (6) Postage..... 417.65
- (7) Printing..... 189.80

2. For property—furnishing, equipment . 3,108.15

II. *For Educational and Informational Work*..... 14,113.14

- (8) Surveys..... 2,030.47
- (9) Exhibits..... 9,390.69
- (10) Library..... 1,844.12
- (11) Publications—printing,
postage..... 847.86

III. *For Work in the Field*..... 109,579.15

1. Payments from Central Office..... 30,968.30

- (12) Salaries, Field Directors 13,355.36
- (13) Thymol*..... 15,476.21
- (14) Field equipment and
supplies..... 742.88

(15) Traveling expenses†... 1,995.84

2. Payments from special budgets for field
work‡..... 78,008.86

- (16) Central America..... 17,446.64
- (17) West Indies§..... 28,822.84
- (18) British Guiana..... 9,711.36
- (19) Egypt§..... 19,466.66
- (20) British Advisory Com-
mittee..... 2,561.36

*To be ultimately charged to the field office by which used or distributed at cost.

†To and from field.

‡Amounts forwarded.

§Equivalent in England pounds, \$4.86¾.

